Republic of South Africa

EDICT OF GOVERNMENT

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SANS 708 (2007) (English): Refrigerated farm milk tanks

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Edition 2.2

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SOUTH AFRICAN NATIONAL STANDARD

Refrigerated farm milk tanks

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Table of changes

Change No.	Date	Scope
Amdt 1	1984	Amended to clarify the means by which the levelness of the milk tank is verified.
Amdt 2	2007	Amended to change the designation of SABS standards to SANS standards, to update the definition of “acceptable”, to remove reference to the standardization mark and to update the referenced standards.

Acknowledgement

Standards South Africa wishes to acknowledge the valuable assistance derived from publications of the following organizations:

British Standards Institution

International Standards Organization

Standards Association of Australia

Foreword

This South African standard was approved by National Committee StanSA TC 5120.53, *Freight containers*, in accordance with procedures of Standards South Africa, in compliance with annex 3 of the WTO/TBT agreement.

This document was published in June 2007. This document supersedes SABS 708:1982 (edition 2).

A vertical line in the margin shows where the text has been technically modified by amendment Nos. 1 and 2.

Contents

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Refrigerated farm milk tanks

1 Scope

1.1 This specification covers the requirements for two types and two classes of refrigerated tanks in which milk is cooled and stored on farms. It does not cover tanks that are subjected to pressure or vacuum.

NOTE

a) Because unsatisfactory installation of a tank results in ineffective functioning of the tank, it is recommended that milk tanks be installed in accordance with SANS 10132.

b) Because it is impracticable to test samples taken from each consignment of refrigerated tanks for compliance with some of the requirements of this specification, no specific sampling procedure has been included, but the tests specified in section 7 must be carried out on at least one tank of each model.

   Proof of compliance of a specific tank or consignment of tanks with all the relevant requirements needs suitable agreement between the supplier and the purchaser. **Amdt 2**

   This agreement would have to provide for

   1) the submission to the purchaser of proof of the compliance with the specification of a prototype, i.e. a tank having the same model designation; and

   2) the granting to the purchaser of access to records of raw materials used, and access to the factory to ensure that this tank or consignment of tanks has been made in the same manner as the prototype from materials at least equal in quality to those used in the manufacture of the prototype.

c) The standards referred to in the specification are listed in appendix A.

d) Requirements that must be specified by the purchaser and a requirement that must be agreed upon between the purchaser and the supplier are listed in appendix B.

2 Definitions

2.1 For the purposes of this specification the following definitions shall apply:

acceptable
acceptable to the authority administering this standard, or to the parties concluding the purchase contract, as relevant **Amdt 2**

capacity
the maximum volume of milk that a refrigerated tank can contain without spilling when the agitator is switched on

chilled water system
a system of cooling in which heat from the milk is transferred by a cooling agent (usually water) to a refrigerant

cladding
covering that encloses the insulation of a refrigerated tank

cooling equipment
all equipment (supplied with a tank) whose function is to cool the milk uniformly and maintain it within a specific temperature range

defective
a refrigerated tank that fails in one or more respects to comply with the appropriate requirements of the specification

direct expansion system
a system of cooling in which heat from the milk is directly transferred to a refrigerant

effective seal
a seal that prevents the ingress of moisture, insects, and other foreign material

inner vessel
the component (of a tank) in which milk is cooled and stored

outer vessel
the component (of a tank) in which the inner vessel is secured and which, in the case of a type B tank, may serve as the cladding

refrigerated tank
a tank together with its agitator and cooling equipment

tank
the complete assembly consisting of an inner vessel, an outer vessel, thermal insulation, cladding (when relevant), and the supports

3 Types and classes

3.1 Refrigerated tanks shall be of one of the following types and of one of the following classes, as specified by the purchaser:

a) **Types**

Type A: A refrigerated tank that has a chilled water system for cooling the milk.

Type B: A refrigerated tank that has a direct expansion system for cooling the milk.

b) **Classes**

Class ED: A refrigerated tank that is emptied every day and is designed to cool half its capacity twice in every 24 h (see also 5.5.1).

Class AD: A refrigerated tank that is emptied on alternate days (or less frequently) and is designed to cool one quarter of its capacity twice in every 24 h (see also 5.5.1).

4 Constructional requirements

4.1 Materials

4.1.1 Stainless steel

All metal surfaces that are designed to come into contact with milk shall be of an AISI 304 austenitic stainless steel or other acceptable grade of weldable austenitic stainless steel. **Amdt 2**

4.1.2 Other metals

Metals for cooling coils and other components that are designed to come into contact with water shall be acceptable and such as to minimize electrolytic corrosion as far as possible.

4.1.3 Rubber

Rubber components designed to come into contact with milk shall comply, in the case of joint rings, with all the relevant requirements of SANS 974-2, and in the case of other components, with the relevant requirements for materials, hardness, tensile strength, compression set, resistance to butter fat, and steam resistance of SANS 974-2.

4.1.4 Other materials

Materials used for components not designed to come into contact with milk or water shall be of acceptable quality.

4.2 Dimensions

4.2.1 Bridges, openings, and manholes

a) The width of a bridge shall not exceed 700 mm and the sum of the clearances between the bridge and the relevant of the following shall be at least 600 mm:

   1) the outer ends of the inner vessel of a rectangular tank (measured along the length of the tank);

   2) the periphery of the inner vessel of a round tank (measured along the diameter at right angles to the bridge).

b) Each manhole of a closed tank shall have,

   1) in the case of a round manhole, a diameter of at least 425 mm, and

   2) in the case of an elliptical manhole, major and minor axes of at least 400 mm and 300 mm, respectively.

4.2.2 Length of supports

The length of the tank supports (see 4.3.4) shall be such that, when the tank is installed on a horizontal floor, the base of the levelled tank (excluding the outlet pipe) shall be situated above two imaginary planes each having a gradient of 1 in 10 to the horizontal and for which the line of intersection is horizontal and 100 mm above the floor (see figure 1).

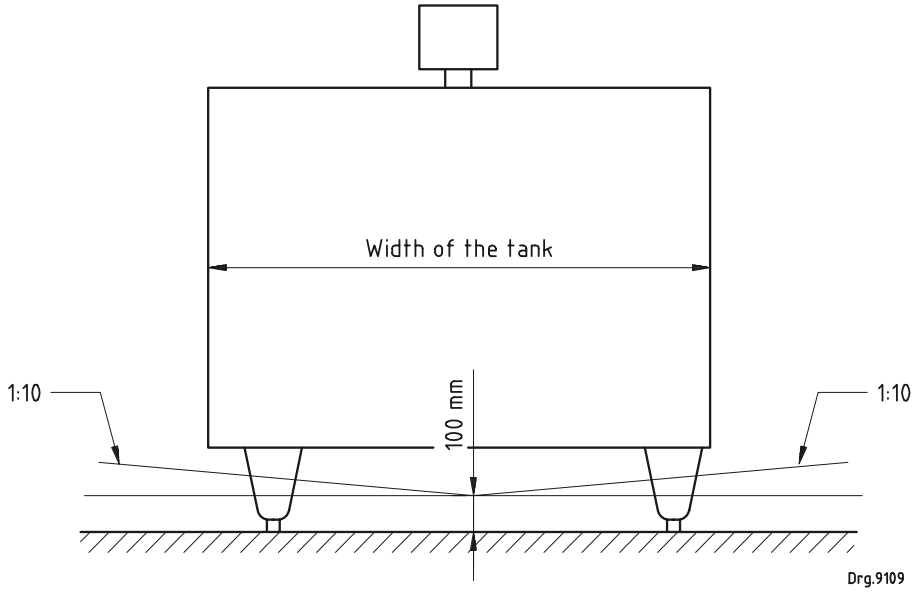

Figure 1 — Clearance between the tank base and a horizontal floor

4.2.3 Thickness of materials

The thickness of materials used shall be such as to ensure that the components of a tank comply with the requirements of 4.6.1.

4.2.4 Capacity

The capacity of a tank (see 6.1.1(c)) shall be as agreed upon between the purchaser and the supplier.

4.3 Tanks

4.3.1 General

A refrigerated tank shall be so designed and constructed as to embody the most hygienic principles of handling, cooling, and storing milk.

4.3.2 Joints

a) **General**. All joints shall be effectively sealed either by the method of manufacture or by the use of an acceptable filler material.

b) **Welded joints**. Except as provided for in (c) below, all joints shall be welded. The welding procedure used shall be such as to ensure that the weld metal deposits and the heat-affected zones have mechanical and corrosion-resistance properties at least equal to the minimum values specified for the parent metal.

   The fillet welds on all attachments to the inner vessel, the bridge, and all other surfaces that will come into contact with the milk shall have a smooth concave surface of radius at least 5 mm.

c) **Riveted joints**. Joints between the breast piece and the cladding or the outer vessel (as relevant) may be riveted.

4.3.3 Junctions between metal surfaces

Upturns and downturns at the edges of the bridge (if there is one), breast piece, and cover(s) shall be integral with the components, and the angle at the inside of the bends shall be rounded to a radius of at least 3 mm.

4.3.4 Supports

The number, position, and diameter of the supports shall be such that the tank is adequately supported. The supports shall be attached to the outer vessel by screwed sockets that are welded to the underside of the outer vessel and that allow such adjustment of the length of the supports that the tank can be levelled on a floor that has a slope of 1 in 50. (See also 4.2.2.)

4.3.5 Level verification

A tank shall (for the purpose of levelling during installation and future control) be provided with an acceptable device by means of which the levelness of the tank (in the longitudinal and transverse directions) can be verified. The manner of mounting of the device shall be such that the mounting cannot inadvertently be disturbed. **Amdt 1**

4.3.6 Drainage

The surfaces of the breast piece, bridge (if there is one), main covers, and manhole covers shall be so sloped that condensate and other moisture will drain away from the inner vessel.

4.3.7 Accessibility for cleaning and sterilization

All surfaces and all fixed fittings and accessories that are designed to come into contact with milk shall be readily accessible for inspection, cleaning, and sterilization.

Fittings and accessories that are not fixtures shall be capable of being easily removed (and, when relevant, dismantled) for the purposes of cleaning and sterilization.

4.3.8 Thermal insulation

The inner vessel shall be surrounded by a thermal insulating medium that is non-settling and not liable to become displaced during normal service conditions.

The thermal insulation shall be such that, when a tank is tested in accordance with 7.7.3, the surface temperature (determined by measurement as in 7.7.3(d)) of the contents of the inner vessel does not rise above 10 °C, and the rise in the average temperature of the contents of the inner vessel does not exceed 3 °C.

4.3.9 Sealing of thermal insulating medium

The thermal insulating medium shall be so enclosed as to be effectively sealed. The material used for the enclosure shall not react with the thermal insulating medium and shall be capable of effectively resisting the action of detergents or other washing agents.

4.3.10 Apertures, inspection openings, and manholes

a) Apertures in the bridge (if there is one) and main covers, inspection openings in the breast piece, and manholes shall have upturned edges. The height of the upturn shall be at least 6 mm in the case of apertures of diameter not exceeding 75 mm, and at least 10 mm in the case of larger apertures and inspection openings in the breast piece. Covers shall have downturned edges that

overlap the upturned edges of the aperture or inspection opening (as relevant) by at least 6 mm. The clearance between the faying surfaces of a cover and the aperture or inspection opening shall not exceed 2 mm.

b) Inspection openings in the vertical surfaces of the cladding shall have upturned edges and covers that are so designed that they are readily removable but are positively retained in position and overlap the upturned edges of the openings by at least 12 mm.

c) Manholes (see 4.2.1) shall be so designed that a manhole cover will fit properly.

4.3.11 Inner vessel

The design of the inner vessel shall be such that, when the tank is tested in accordance with 7.9 in its reference position and containing 40 L of water, at least 39,8 L of the water will drain out within 1 min.

Internal corners in the inner vessel shall be smoothly rounded to a radius of at least 12 mm.

4.3.12 Outer vessel

The outer vessel shall be of acceptable material and of leak-free construction (see also 4.3.2 and, when relevant, 4.3.9). In the case of a type A tank, the outer vessel shall be fitted with a screwed outlet (drain) of diameter at least 25 mm, and a mating outlet plug. The outlet shall be so positioned and designed that the vessel drains completely when the plug is removed.

4.3.13 Milk outlet

a) **Diameter of orifice**. The milk outlet shall have an orifice of diameter at least 48 mm and, if in the bottom of the vessel, shall be in a well of depth at least 25 mm, situated at the lowest point of the inner vessel.

b) **Outlet pipe**. The orifice shall drain through an outlet pipe

1) of which the outside diameter is such that thread with a nominal size of 50 mm can be used in accordance with BS 4825-5; **Amdt 2**

2) that is so constructed as to be hygienic in service (except that a rolled-on ferrule or a flange may be fitted to it at a position outside the outer vessel);

3) that, if not in one piece, has not more than one joint, the joint being situated outside the tank in an accessible position;

4) that is as short as is reasonably practicable;

5) that terminates in a 51 mm ring-joint type male end with outer thread that is fitted with a blank cap and nut of stainless steel or other acceptable material; and

6) of which, if it comes out at the side of the tank, the outer end is not higher than the bottom of the inner vessel (see figure 2).

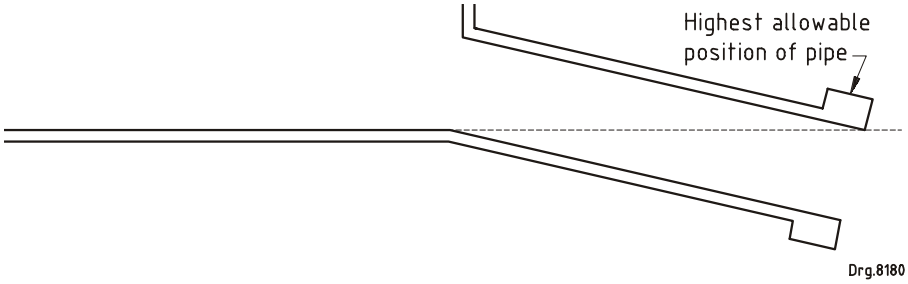

Figure 2 — Position of outlet

c) **Control**

1) If an outlet valve is used, it shall (unless of the butterfly type) comply with the relevant requirements of BS 4825-5. If the valve is of the butterfly type, its design shall be such that it can be cleaned easily. In both cases, the valve shall be free-draining and shall be removable for cleaning purposes. **Amdt 2**

2) If a rod-and-plug mechanism is used it shall be such (and shall be so attached) that

i) it has no detachable component that might pass through the outlet;

ii) the plug does not need to be clamped in order to seal the outlet; and

iii) the mechanism, when in the released position, is clear of the agitator.

4.3.14 Breast piece

The breast piece shall be in one piece and its inner perimeter shall have an upturned edge, of height at least 6 mm, for welding to the inner vessel. The breast piece shall be such that any fluid will run off on the outside of the tank. The edges shall be so secured and sealed as to prevent the penetration of fluid between the breast piece and the outer vessel.

4.3.15 Bridge

If there is a bridge, its sides shall have upturned edges of height at least 10 mm. The edge(s) of the end(s) shall be so turned down as to enable the bridge to be welded to the inner vessel.

4.3.16 Covers

a) **Main cover(s) (for open tanks)**. Each section of the open top of the inner vessel shall have a hinged cover. The hinging shall be such that a cover can be removed when so desired.

The free edges of the main cover(s) shall be so turned down as to overlap the upturned edges of the breast piece (and bridge, if there is one) and to ensure that the clearance between the breast piece and the main cover is at least 2,5 mm.

The handle(s) on a main cover shall be external and so attached that the inner surface of the cover is smooth and hygienic. Each cover shall be provided with a mechanism that is capable of maintaining the cover in an approximately half-open position.

b) **Manhole cover(s) (for closed tanks)**. Each manhole cover shall be so designed that it will acceptably overlap and seal the mating manhole. The manhole cover shall be provided with an acceptable means to maintain it in the closed position.

c) **Ventilation**. A closed tank shall be furnished with a ventilator that will ensure the easy draining of the tank and shall be so constructed that, whether the tank is in operation or not, it will present an effective seal.

4.4 Tank fittings

4.4.1 Agitator

The blades of an agitator shall be welded (see 4.3.2(b)) to the shaft, and the shaft shall be fitted with,

a) on the outside of the tank, a coupling that facilitates removal of the agitator, and

b) between the motor and the outside of the tank, a movable deflector of acceptable material that so fits the shaft as to prevent the entry of moisture and contaminants into the inner vessel.

4.4.2 Cooling equipment

Transfer of heat from the milk to the refrigerant shall be via the surface of the inner vessel only. Cooling equipment shall be rigidly constructed, shall not cause damage to the tank components by vibration, and shall be designed to operate on dichlorodifluoromethane or other acceptable refrigerant.

4.4.3 Instruments

Each refrigerated tank shall be provided with an acceptable temperature indicating device, a thermostat, and, in the case of a type A tank, an ice-bank controller. The positioning of the temperature indicating device shall be such that the indicated temperature can be easily read.

The instruments shall be effectively sealed. A thermometer (when relevant) shall be graduated as follows:

The 0-40 °C portion of the scale shall cover a length of at least 50 mm, and the 1-15 °C portion shall be in intervals of 1 °C.

In the case of a digital thermometer, the figures shall have a height of at least 6 mm.

4.4.4 Dipstick

a) **General**. A dipstick shall consist of a graduated straight blade welded to a collar and provided with an acceptable mounting flange or boss arrangement all made of stainless steel. The fit of the dipstick shall be such that, when the dipstick is withdrawn, the layer of milk is not wiped off (see 4.4.5(a)).

b) **Design**. A dipstick shall be designed as follows:

1) **Blade**. The width and thickness of the blade shall be at least 20 mm and 3 mm, respectively. The length shall be such that the dipstick can measure, without touching the bottom of the tank, the volume of the contents over a range of at least 5-100 % of the capacity of the tank for tanks of capacity up to and including 1 000 L, and 10-100 % of the capacity of the tank for larger tanks (see 4.4.6(f)).

2) **Graduation lines (spacing)**. The graduation lines shall be engraved into the blade and shall be at intervals of 1 mm and the accuracy of their spacing shall be such that the cumulative error between two graduation lines at any position on the blade shall not exceed the appropriate of the following:

10 mm apart	± 0,1 mm
100 mm apart	± 0,2 mm
300 mm apart	± 0,3 mm
500 mm apart	± 0,4 mm
1 m apart	± 1,0 mm

3) **Graduation lines (dimensions)**. The dimensions of the graduation lines shall be as follows:

Thickness		0,2 ± 0,05 mm
Depth		0,04 mm, min.
Length:	Primary scale	4 ± 1 mm
	Every fifth line	7 ± 1 mm
	Every tenth line	10 ± 1 mm

4) **Height and position of figures**. Every tenth line shall be numbered. The figures shall be 4 ± 1 mm high and shall be either at right angles to or parallel to the axis of the dipstick. The scale on the dipstick shall start at zero at the top.

5) **Finish**. The graduated surface shall be dull (matt). All other surfaces shall be polished.

4.4.5 Sockets

a) **Preferred type**. The shape of the socket shall be such as to form a sliding fit with the collar of the dipstick (see 4.4.4(a)), and the internal diameter of the socket shall be 0,1 ± 0,01 mm larger than the external diameter of the collar. The socket shall have a length of at least 45 mm and, at the upper end, a flange that is at right angles to the axis of the socket. The socket shall be so installed and secured that the flange is level when the tank is level.

b) **Other types**. Where other types of sockets are used, the shape and method of mounting shall be such that the mating dipstick will be held in a manner no less effective than that described in 4.4.5(a).

4.4.6 Chart

a) A chart[1)] (see appendix C) in which the volume in litres is plotted against the dipstick graduations in millimetres, shall be supplied with each tank.

b) The chart shall be so covered or enclosed as to be protected against moisture and handling.

c) The serial number of the tank and dipstick applicable to the chart shall be shown on the chart.

d) The type of figures used shall be standard Arabic figures that are clear and legible.

e) The chart shall be easily readable.

1) Users should ensure that the chart is displayed near the tank.

f) The accuracy of the chart shall be such that, when the tank is calibrated in accordance with 7.8, any reading on the chart between 5 % and 100 % or 10 % and 100 %, as relevant (see 4.4.4), of the capacity of the tank does not differ by more than 0,5 % from the actual content.

4.5 Finish

4.5.1 Stainless steel

The surface roughness of the finish (including welded areas) on inner and outer surfaces of the tank shall not exceed that of the rough satin-polish finish on the corresponding standard sample held by the South African Bureau of Standards[2)].

4.5.2 Other surfaces

Surfaces of materials that are not intrinsically corrosion resistant shall be rubberized or shall be covered with other acceptable surfacing material so applied as to provide an acceptable, hygienic, and corrosion-resistant finish.

4.5.3 Weld areas

Weld areas (other than those in 4.5.1 above) shall have been ground smooth and polished.

4.6 Strength

4.6.1 Tank

The components of a tank shall have sufficient rigidity to ensure that they remain in their fixed positions and do not buckle or sag during normal operation, cleaning, or maintenance and, when a tank is tested in accordance with 7.3,

a) the water level readings taken at the beginning and at the end of the test shall be identical;

b) at the end of the test the tank shall be level and the dipstick vertical;

c) after the test the inner vessel, the bridge (if there is one), and the breast piece shall show no sign of distortion, deflection, buckling, movement relative to the tank, or other defect;

d) the tank shall not leak.

4.6.2 Main cover

A main cover that is designed to support strainers or hoppers for the reception of milk, shall be strong enough to provide such support without becoming deformed.

4.6.3 Evaporator

When tested in accordance with 7.4, the evaporator shall show no sign of leakage, distortion, or other defect.

4.7 Temperature control

Each tank shall be provided with one or more switches that perform the functions shown in column 2 of table 1 or of table 2, as relevant.

2) Manufacturers may, on application to the South African Bureau of Standards, inspect the standard sample.

Table 1 — Type A tanks*

1	2
Switch setting	**Function of switch**
OFF/AF	To isolate the coolant circulation, compressor and agitator motors from the main supply
AUTO/OUTO	To provide the following a) automatic thermostatic control and interlocking of the coolant circulation and agitator motors so that failure of either will stop the other; b) automatic control of the compressor motor by the ice-bank controller; and c) automatic control of air pump or water-circulation pump
ON/AAN	a) To provide manual control of the compressor, coolant circulation and agitator motors by overriding the thermostat; b) to provide, for a period of at least 5 min, manual control of the agitator motor when the agitator has to be operated after cooling; and c) to switch on the automatic washing cycle
* Each manually operated switch should preferably be provided with a pilot light that lights up when the switch is in the ON position.	

Table 2 — Type B tanks*

1	2
Switch setting	**Function of switch**
OFF/AF	To isolate the compressor, fan (when relevant), and agitator motors from the main supply
AUTO/OUTO	To provide automatic thermostatic control and interlocking of the compressor, fan (when relevant), and agitator motors so that failure of any will stop the others
ON/AAN	a) To provide manual control of the compressor, fan (when relevant), and agitator motors by overriding the thermostat; b) to provide, for a period of at least 5 min, manual control of the agitator motor when the agitator has to be operated after cooling; and c) to switch on the automatic washing cycle
* Each manually operated switch should preferably be provided with a pilot light that lights up when the switch is in the ON position.	

5 Performance requirements

5.1 Temperature indicating devices

When a temperature indicating device is tested in accordance with 7.5.1 and 7.5.3, any difference between the temperatures registered by the device under test and by the standard temperature indicating device shall not exceed 0,5 °C at any graduation between 0 °C and 10 °C.

5.2 Thermostat

The thermostat shall operate satisfactorily when the inner vessel contains any quantity of milk between 5 % and 100 % or 10 % and 100 %, as relevant, of its capacity and the top of the thermostat is in air at any ambient temperature between 0 and 32 °C. In addition, when the thermostat is tested in accordance with 7.5.2 and 7.5.3,

a) all cut-out temperatures shall be between 3,5 °C and 4,5 °C; and

b) all cut-in temperatures shall be between 4,5 °C and 5,5 °C.

5.3 Ice-bank controller (type A tanks)

The ice-bank controller of a type A tank shall, under normal operating conditions, prevent the ice-bank from coming into contact with the surface of the inner vessel and, when the controller is tested in accordance with 7.5.3, the ice-bank shall not be in contact with the surface of the inner vessel when the condensing unit cuts out.

5.4 Agitator

When the volume of milk in the inner vessel is at least 10 % of the capacity of the tank, the agitator assembly shall promote effective heat transfer and uniform fat distribution without churning or spilling the milk. In addition, when the agitator is tested in accordance with 7.6,

a) the fat content of the three samples in each set shall be uniform to within 0,10 %; and

b) any difference between the milk temperatures determined in the test shall not exceed 0,5 °C.

5.5 Cooling system

5.5.1 Cooling

The cooling system shall be such that, when it is tested in accordance with 7.7.2, the cooling unit cools the contents of the tank to 5 °C within 2,5 h.

5.5.2 Prevention of ice loss (type A tanks)

The cooling system of a type A tank shall prevent any loss of ice during a complete 24 h or 48 h cycle (as relevant) and, after it has been tested in accordance with 7.7.4, the residual mass of the ice shall be not less than the initial mass of the ice.

5.5.3 Prevention of freezing (type B tanks)

The cooling system of a type B tank shall be such that, when the tank is tested in accordance with 7.7.2,

a) no freezing of milk occurs during a complete 24 h or 48 h cycle (as relevant) of normal operation; and

b) there is no indication of ice formation on more than 2 % of the evaporation surface of the exposed areas of the evaporator and no visible indication of residual ice on the surface of the inner vessel.

6 Marking and instructions

6.1 Marking

6.1.1 Tanks

Each tank shall bear the following information legibly and durably marked as in 6.2:

a) the manufacturer's name or trade name or trade mark;

b) the serial number and model designation;

c) the capacity of the inner vessel, in litres;

d) the minimum required cooling capacity of the refrigeration unit, in watts;

e) the class identification, as follows:

1) on tanks for every-day collection ..... ED

2) on tanks for alternate-day collection ..... AD

f) the year of manufacture.

6.1.2 Dipsticks

The serial number of the tank shall be legibly and durably marked on each dipstick.

6.2 Nameplates

The information required in terms of 6.1.1 shall be marked on a nameplate that is firmly attached to the tank in an acceptable position and manner. The nameplate shall preferably be made of stainless steel. Other metallic materials may be used, but in such cases special attention should be paid to the quality, finish, and method of attachment of the nameplate and to the prevention of electrolytic reaction between the material of the nameplate and that of the part of the tank to which the nameplate is attached.

6.3 Instructions

Each tank shall be accompanied by printed instructions, in both official languages, that include the following:

a) instructions for its correct and safe operation;

b) instructions relating to its use as a measuring instrument;

c) the correct cleaning and sterilizing procedure for the inner vessel, the milk outlet, and other milk contact surfaces, and all components to whose surfaces the milk could be exposed.

7 Inspection and methods of test

7.1 Inspection

Examine and measure the refrigerated tank for compliance with all the requirements of sections 4-6 compliance with which is not assessed by the tests given in 7.3-7.9 (inclusive).

7.2 Test conditions

Set the tank level in accordance with its level indicators (see 4.3.5) and ensure that the tank is still level at the beginning of each test.

7.3 Strength test (tanks)

Test the strength of the tank as follows, checking during the test for compliance with the requirements of 4.6.1(d):

a) Add water to 100 % of the capacity of the tank (as indicated on the dipstick) and mark the water level on the inner vessel.

b) Continue adding water until the water surface reaches the brim of the inner vessel.

c) Maintain this condition for at least 12 h.

d) Drain the water until its surface again coincides with the mark on the inner vessel, note the water level indicated on the dipstick, and check for compliance with the requirements of 4.6.1(a).

e) Drain the water completely and check the tank and the dipstick for compliance with the requirements of 4.6.1(b).

f) Examine the tank components for compliance with the requirements of 4.6.1(c).

7.4 Hydrostatic pressure test

a) Isolate the evaporator from the cooling unit.

b) Using nitrogen (to which a small quantity of freon has been added to indicate leakage) as a medium, apply to the evaporator the appropriate of the following pressures:

   1) in the case of a type A tank: twice the normal working pressure of the cooling system;

   2) in the case of a type B tank with

      i) a dichlorodifluoromethane system: a pressure of 1,4 MPa;

      ii) a system using another cooling agent: the vapour pressure of the cooling medium at 50 °C.

c) Maintain the specified pressure for 10 min, and then examine the cooling system for compliance with the requirements of 4.6.3.

7.5 Tests on instruments

7.5.1 Calibration test (temperature indicating devices)

a) Place the sensor of the temperature indicating device under test and one or more standard calibrated temperature indicating devices, of which the smallest temperature interval does not exceed 0,1 °C, in a water bath in which the water is stirred continuously.

b) Reduce the temperature of the water in the bath to less than 1 °C. Increase the temperature slowly and record the temperatures registered on the temperature indicating device under test as soon as the temperature of the water bath (as indicated by the standard temperature indicating device(s)) reaches 2 °C, 4 °C, 6 °C, 8 °C, and 10 °C.

c) Remove the sensor of the temperature indicating device under test from the water bath and place it in a water bath at 70 ± 2 °C for 5 min. Remove the sensor and let it cool to ambient temperature.

d) Repeat steps (a) and (b) above once more, and check for compliance with the requirements of 5.1.

7.5.2 Calibration test (thermostats)

a) Place the sensor of the thermostat in a suitable water bath in which the water is stirred continuously.

b) Connect an ohm-meter or other suitable indicator to the contact points of the thermostat.

c) Monitor the temperature of the water bath with a calibrated standard temperature indicating device of which the smallest temperature interval does not exceed 0,1 °C.

d) By varying the water bath temperature at a rate of not more than 0,3 °C per minute, determine the cut-out and cut-in temperatures of the thermostat.

e) Remove the sensor and place it in a water bath at 70 °C for 5 min. Remove the sensor and let it cool.

f) Repeat steps (a)-(d) above once more, and check for compliance with the requirements of 5.2.

7.5.3 Performance test (instruments)

a) In the case of a type A tank, fill the water compartment of the tank to the required level.

b) Fill the tank (type A or B, as relevant) to 10 % of its capacity with water at ambient temperature. With the cooling unit set at automatic control, record the readings registered on the temperature indicating device under test when those registered on a calibrated standard temperature indicating device are 10 °C, 7 °C, and 5 °C, and record the cut-out temperature. In the case of a type A tank, note the position of the ice-bank in relation to the surface of the inner vessel each time the compressor motor cuts out.

c) With the agitator switched on, add water at 35 ± 1 °C at a rate of 0,25 % of the capacity of the tank per minute, until the cooling unit cuts in. Record the cut-in temperature on both temperature indicating devices.

d) Repeat the test a further four times and check in each case for compliance with the requirements of 5.1 (for the temperature indicating device), 5.2 (for the thermostat) and, in the case of a type A tank, 5.3.

7.6 Performance test (agitators)

a) Fill the inner vessel with milk to 100 % of its capacity, operate the tank until the mean temperature of the milk is lowered to 4,5 °C, and switch off all motors.

b) Allow the milk to remain undisturbed for 6 h.

c) Agitate the milk for 5 min and take milk samples from

   1) the surface near the agitator spindle;

2) a point on the surface remote from the agitator;

3) the outlet after draining off 1 L of the milk.

d) While taking the samples, note the milk temperatures at the following positions:

1) 6 mm below the milk surface at (i) he agitator spindle, and (ii) the extremities of the inner vessel;

2) near the bottom of the inner vessel.

e) Determine (in duplicate) the fat content of each sample by the relevant method given in BS 696-2.

f) Check the results for compliance with the requirements of 5.4.

7.7 Performance tests (cooling systems)

7.7.1 Test conditions

Ensure that

a) the refrigerating unit is positioned within 5 m of the tank under test;

b) the tank (with its main covers, when relevant, open or removed) is subjected for 6 h prior to the start of the tests given in 7.7.2 to an ambient temperature of 32 ± 1 °C, and that this temperature is maintained throughout these tests;

c) the thermometer, thermostat, and ice-bank controller are in their operating positions within the tank.

7.7.2 Cooling test (all tanks) and test for prevention of freezing (type B tanks)

a) Fill the tank with water to 100 % of its capacity.

b) Set the cooling system for automatic control, switch it on, and cool the water to 12 °C for a class AD tank and 19 °C for a class ED tank. Switch off the compressor and the agitator.

c) Switch on the cooling system after 30 min, and record the time taken to cool the water to 5 °C. Check for compliance with the requirements of 5.5.1.

d) In the case of a type B tank cool the water further until the thermostat switches off the cooling system unit and check for compliance with 5.5.3.

7.7.3 Test for the efficacy of the thermal insulating medium

NOTE This test must be carried out immediately after the cooling test.

a) Keep the tank filled at 100 % of its capacity and set the cooling system for automatic control.

b) Switch off the motor as soon as the average of the water temperatures reaches 4,5 °C at points

1) below and within 10 mm of the water level, and

2) near the bottom of the inner vessel.

c) Close or replace all covers, as relevant, and let the tank stand at an ambient temperature of 32 ± 1 °C for 16 h.

d) Record the temperature at a point below and within 10 mm of the water level.

e) Stir the water for 2 min and record the average of the water temperatures at the positions indicated in (b) above.

f) Check all temperature readings for compliance with the requirements of 4.3.8.

7.7.4 Test for prevention of ice loss (type A tanks)

a) Fill the tank with water to 50 % of its capacity in the case of a class ED tank and 25 % in the case of a class AD tank, and cool the water to 4,5 °C.

b) Drain and seal the chilled water compartment.

c) Allow the ice to melt completely, drain the resulting water, and seal the water compartment.

d) Determine the mass of the drained water, and record it as "the residual mass of the ice".

e) Allow the tank to stand for 6 h, with the cover(s) off, at an ambient temperature of 32 ± 1 °C.

f) Fill the water compartment with water and cool to 2 °C. Replace the cover(s) and set the compressor to manual control 15 min after the water has reached 2 °C.

g) Repeat steps (b), (c), and (d) but record the mass of the drained water as the "initial mass of the ice".

h) Check for compliance with the requirements of 5.5.2.

7.8 Calibration (tanks)

a) Use any method that will give an accuracy of at least 0,05 % to calibrate the tank from 5-100 % or 10-100 %, as relevant, of its capacity by adding the following quantities of water at a time:

   1) Tanks with a capacity of up to and including 1 000 L ..... approximately 100 L

   2) Tanks with a capacity of more than 1 000 L ..... approximately 10 % of tank capacity.

b) Check for compliance with 4.4.6(f).

7.9 Static draining tests

a) Ensure that the outlet control is closed.

b) Wet the walls of the inner vessel with 40 ± 0,5 L of water at a temperature of between 2 °C and 20 °C.

c) Drain the tank for 5 ± 0,5 min.

d) Add to the tank 40 ± 0,1 L of water at a temperature of between 2 °C and 20 °C.

e) Open the outlet control for 1 min ± 1 s.

f) Determine, to an accuracy of 0,005 L, the volume of water draining out when the outlet control is opened again for 5 ± 0,5 min and check for compliance with the relevant requirements of 4.3.11.

Appendix A[3)]

Applicable standards

Reference is made to the latest issues of the following standards:

AISI 304, *Austenitic stainless steel.* **Amdt 2**

BS 696-2, *Determination of fat content in milk and milk products* (*Gerber method*) – *Part 2: Methods*.

~~BS 1864, *Stainless steel milk pipes and fittings (recessed ring joint type)*~~. **Amdt 2**

BS 4825-5, *Stainless steel tubes and fittings for the food industry and other hygienic applications – Part 5: Specification for recessed ring joint type couplings.* **Amdt 2**

SANS 974-2 (SABS 974-2), *Rubber joint rings (non-cellular) – Part 2: Joint rings for use in the dairy industry*.

SANS 10132 (SABS 0132), *Installation and operation of refrigerated milk tanks*.

Appendix B

Notes to purchasers

B.1 The following requirement must be specified in tender invitations and in each order or contract:

The type and the class (see 3.1).

B.2 The following requirement must be agreed upon between the purchaser and the supplier:

The capacity (see 4.2.4).

Appendix C

Tank contents chart

C.1 The following chart gives the layout of a typical contents chart suitable for supply with a refrigerated farm milk tank (see 4.4.6):

3) The information in the appendices is additional to that in the specification and has been included purely for amplification and guidance.

Typical contents chart

Contents chart for refrigerated farm milk tank

Make and model ..... Tank and dipstick serial No. .....

Tank capacity ..... Litres Date verified .....

Dipstick divisions – ..... mm

Reading	Litres	Reading	Litres	Reading	Litres	Reading	Litres	Reading	Litres	Reading	Litres
000		050		100		150		200		250	
001		051		101		151		201		251	
002		052		102		152		202		252	
003		053		103		153		203		253	
004		054		104		154		204		254	
005		055		105		155		205		255	
006		056		106		156		206		256	
007		057		107		157		207		257	
008		058		108		158		208		258	
009		059		109		159		209		259	
010		060		110		160		210		260	
011		061		111		161		211		261	
012		062		112		162		212		262	
013		063		113		163		213		263	
014		064		114		164		214		264	
015		065		115		165		215		265	
016		066		116		166		216		266	
017		067		117		167		217		267	
018		068		118		168		218		268	
019		069		119		169		219		269	
020		070		120		170		220		270	
021		071		121		171		221		271	
022		072		122		172		222		272	
023		073		123		173		223		273	
024		074		124		174		224		274	
025		075		125		175		225		275	
026		076		126		176		226		276	
027		077		127		177		227		277	
028		078		128		178		228		278	
029		079		129		179		229		279	
030		080		130		180		230		280	
031		081		131		181		231		281	
032		082		132		182		232		282	
033		083		133		183		233		283	
034		084		134		184		234		284	
035		085		135		185		235		285	
036		086		136		186		236		286	
037		087		137		187		237		287	
038		088		138		188		238		288	
039		089		139		189		239		289	
040		090		140		190		240		290	
041		091		141		191		241		291	
042		092		142		192		242		292	
043		093		143		193		243		293	
044		094		144		194		244		294	
045		095		145		195		245		295	
046		096		146		196		246		296	
047		097		147		197		247		297	
048		098		148		198		248		298	
049		099		149		199		249		299	